

A city's trees

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As a relief project the City of Danville, Illinois, instigated a tree survey during the months of August, September, and October of 1934, under the supervision of the street commissioner. The object of the survey was to determine the condition of all trees on public property and those of private property in the front yards and to locate dying and diseased elms in an effort to check or prevent further spread of the diseases that seemed so common.

THE TREES OF DANVILLE, ILLINOIS

More than 18,000 trees were examined in the three months and this was probably 90% of the trees within the main part of the city. Of these trees 59% were healthy, 38% in need of care, and 3% were dead; 29% of the trees, or 7,000, were on public property and of these 61% were healthy, 36.6% needed care, and 2.4% were dead. Of the 11,000 trees on private property, or 71% of the total, 57% were healthy, 39.4% needed care, and 3.6% were dead. Trees in the parks were, with the exception of the elms, in uniformly good condition. Trees on the boulevards were crowded and starved and were in poor condition. As the trees on private property have more room to grow, it would be expected that they would be in better condition than those on the boulevards. This was not true for the condition of trees in both situations was relatively the same.

There were 29 different groups of shade trees in the city and of these, eight constituted 87%. These eight were soft maples, elms, box elders, catalpas, ailanthus, hard maples, cotton-woods, and oaks.

SOFT MAPLES

Three thousand three hundred and thirty soft maples were examined and of these 38% were on public property and 62% on private. They constituted 17% of the city's trees. Only 56% of the trees were found to be healthy. This is due to the fact that they have been butchered throughout the town. Soft maples are very susceptible to heart rots and wherever they are injured they tend to rot. Nineteen per cent of them had been topped and in no instance was a topped tree found to be free of

heart rot. This holds true for practically every kind of tree. This fact alone would condemn the practice of topping. Besides topped trees, 19% of the untopped trees were rotten from wounds and bad pruning. This means, then, that 38% of the city's most numerous trees have been ruined by neglect and maltreatment. No diseases were apparent in sufficient abundance to endanger the life of the trees and only 1.6% were dead. As the summer was very hot, many of the soft maples had tip burned, especially on boulevards where they were subjected to intense heat from the pavement.

ELMS

The survey was deemed necessary from the continued and extensive death of elms. For the past five years, elms, both American and Slippery, had been dying in great numbers. For the past three years the rainfall had been low in midsummer and drouth had been long, so that the water table had been greatly reduced. This lack of water has been attributed by many as the cause of the death of the elms, but it was found that in addition several diseases were killing the trees.

In Danville three diseases were most apparent and of them, one was most injurious. Nearly 3,000 elms were examined and of these 63% were healthy, 26% were sick, and 11% were dead. Elms constituted 15% of the trees and more than 1,000 were sick or dead. The one fungus causing most of this destruction seemed to be *Xylaria*, a root disease. The other two diseases, *Coniothyrium* and *Vermicularia*, limb diseases, were killing fewer trees.

The apparent methods of attack for these diseases will be given. *Xylaria* attacks first the young rootlets of the elm and in the early stages the tree shows a slight thinning of the leaves. Only after examining hundreds of elms does this early condition become apparent and then all that can be said is that the tree does not look quite right. The growth in the twigs will be noted shorter for that year. Then as the disease works back along the root it is killing, the tree shows this condition in two ways: Either there is a general, very apparent thinning of the leaves and the growth is short, or small limbs and individual leaves throughout the tree will turn bright yellow and fall. From then on, in the third or fourth year, the progress of the dis-

ease is very rapid, especially when the tree is subjected to drouth conditions. Several conditions may occur simultaneously or be manifested differently in different trees. A tree which looks in fine condition except for the slightly sick appearance will suddenly turn yellow and all but the tip leaves of the branches fall off. Within two weeks it will be dead or nearly so and loose bark or dead tissue may be found at the base of the tree where the roots have died. In other trees the leaves are small and not very numerous and loose bark may be found at the base. These trees are the more resistant ones which dropped their leaves the year before and attempted to survive the following spring. In all cases where trees were dying or had died, the twig growth for the last three to five years was steadily shorter, showing a decline of the trees. There are several identifying marks about *Xylaria*. In advanced stages when there is no help for the tree, loose bark about the base over the dead tissues can be found, and if this bark is peeled off it will be noted that the diseased tissue extends up the trunk of the tree twenty or thirty feet and finally dwindles to nothing. Eventually *Xylaria* can be cultured from the furthest tips of the limbs, having permeated the whole tree. After a tree has been dead for some time, or when it is dying, white hyphae may be seen under the loose bark, the diseased wood is punky, and, if a piece of wood is chiselled out, it will be found to contain an irregular fine black line at distances ranging from the surface. In most cases this is very easily demonstrated if the fungus is present. On dead roots, occasionally, small upright horns about an eighth of an inch high may be found. These are the fruiting bodies.

Where isolated trees become sick and die from *Xylaria* it seems probable that the fungus spores have been distributed by the wind and have entered the soil. Where elms have been planted in rows, the fungus travels from root to root and from tree to tree. Invariably the tree that is sickened has diseased roots on the side facing the dead tree. In this way rows of 25 or 30 elms have become infected.

Coniothyrium and *Vermicularia* are present in Danville in some abundance but can be controlled and are not alarming. *Coniothyrium* is a limb disease which enters twigs and kills the cambium causing individual limbs to wilt and die. In these

TABLE 1. INFORMATION CONCERNING THE TREES EXAMINED IN DANVILLE, ILL.

Name of Tree	No. on Boulevard	No. on Private Property	No. in Parks	Condition of Trees ¹						Total Trees		
				Healthy	Stubs	Heart Rot	Topped	Tip Burned	Other Diseases		Insects	Dead
1. Soft Maple (Acer)	1286	2042	3	1869	600	632	632	63		55	3331	
2. Elm (Ulmus)	748	1688	431	1801	86	17	17	43		334	2867	
3. Box Elder (Acer Negundo Linn.)	567	1624		800	350	525	591	13		21	2191	
4. Catalpa (Catalpa)	863	1043	15	433	42	1421	76			4	1921	
5. Tree of Heaven (Ailanthus)	476	1363		1776		23	36				1839	
6. Hard Maple (Acer)	615	857	225	1391	220	169	50	75		6	1697	
7. Cottonwood (Populus)	572	744	236	267	776	23	465			17	1697	
8. Oaks (Quercus)	24	834	530	1328	943 ⁵	27	27			97	1552	
9. Walnut (Juglans)	13	167	148	49	170	16	10			10	1388	
10. Ash (Fraxinus)	55	173	49	237	110 ⁸	32	27		239 ⁶	15	328	
11. Hickory (Hickoria)	6	105	121	205	116 ⁸	5				3	277	
12. Linden (Tilia)	47	107	27	162	41	7	5			18	232	
13. Sycamore (Platanus)	26	78	67	167	4	3	3			2	181	
14. Mulberry (Morus)	13	89	19	100	10	8	4			2	171	
15. Willow (Salix)	11	62	40	70	25	11	11			2	121	
16. Hackberry (Celtis)	9	37	53	99	3					2	113	
17. Chinese Elm (Ulmus)	32	61	89	51	3	6	2	20		4	93	
18. Buckeye (Aesculus)	11	39	17	89	5	5	5			1	67	
19. Birch (Betula)	8	43		44						2	51	
20. Lombardy Poplar (Populus)	8	39		42					5		47	
21. Locust (Robinia)	6	35	4	31	5		9			1	45	
22. Wild Cherry (Prunus)	3	10	14	25	4						45	
23. Tulip (Liriodendron)	3	19		19	3						27	
24. Silver Poplar (Populus)	4	12		15	1						22	
25. Hawthorne (Crataegus)		12		11	1		1				16	
26. Sassafras (Sassafras)		6		3		6	6				12	
27. Ginkgo (Salisburia)		4		3		1					6	
28. Kentucky Coffee Tree (Gymnocladus)		3		3							4	
29. Butternut (Juglans)		2		2							3	
Totals	5406	11298	1999	11047	3518	3468	1896	214	1061	422	596	18703

1. One tree often had more than one thing wrong with it. 2. Bagworms, *Psylche*. 3. Tent Caterpillars. 4. Webworm, *Attenua aurea* Fitch. 5. Healthy oaks needed pruning. 6. Leafspot. 7. Tent Caterpillars. 8. Healthy ashes, hickories, and other trees needed pruning.

diseased limbs may be found long brown streaks in the heartwood by which the fungus may be identified. *Vermicularia* is similar in its attack of limbs, but leaves no brown streaks in the wood. It may be identified by the complete browning of the diseased cambium. This browning may be seen by peeling back the bark. Both of these diseases will kill a tree if allowed to progress, but as they begin locally, they may be controlled by careful pruning.

BOX ELDERS

More than 2,000 box elders, or 11% of the trees of Danville, were examined and found to be in uniformly bad shape. They, as well as the soft maple, have been topped and hacked. Only 36% were in a healthy condition and 64% needed care. They were extremely tenacious to life and produced leaves even when practically ready to fall from having been weakened by rots. Twenty-eight per cent had been topped and were rotten, and in addition 24% were gutted with rots entering from injuries and bad pruning. *Gleosporium*, a twig blight, was doing considerable damage and 2% of the trees were severely injured by it.

Box elders are mainly obnoxious because of their numerous insect pests. Practically every tree had a few box elder bugs (*Leptocoris trivittatus*, Say.) and some were crimson colored when the insects gathered on them in the sun. An extremely heavy infestation of these insects occurred all over the city. About 1% of the trees had tent caterpillars in them, but the infestation was not heavy. The bagworms (*Psyche*) that attack box elder trees had severely injured or defoliated 11% of the trees. This heavy infestation was in local groups of trees at different points in the city and could well have been controlled by spraying. In some cases a single tree was topped, full of heart rots, stripped by bagworms, infested with box elder bugs, tip burned from the heat and infested with termites in the rotted heart.

OTHER TREES

Information concerning the remaining trees in the city is given in Table 1. Those listed as healthy had good color in the leaves, were in good structural condition and had no noticeable

diseases or insect pests. Those trees which had been poorly pruned are listed under "stubs." Those badly infected with heart rots from other causes than topping and those that had been topped are listed separately. Under the heading "tip burn" have been placed all those that showed sunburn, heat scald, etc. Under the heading "other diseases" have been listed all those showing the effects of diseases other than rots.

SUMMARY

Trees in the City of Danville, Illinois, were examined in 1934 for physical defects and diseases. Only 59% of the entire tree population, 18,700, which was more than one tree to every two persons, were healthy and 38% were in dire need of care. Three per cent were dead at the time of the survey and more elms have died since. This death of elms has been attributed to a group of causes including drouth and disease. All of the trees have been subjected to the unhealthy condition of the city and most of them are showing the effects of this.

URBANA, ILLINOIS